

THE SATELLITE PROVING GROUND FOR MARINE, PRECIPITATION, AND SATELLITE ANALYSIS 2014 DEMONSTRATIONS

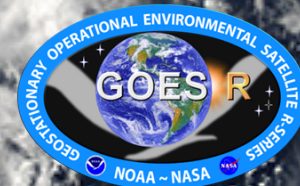
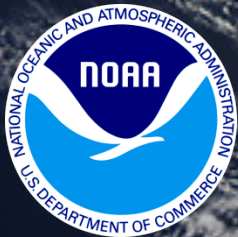
**Michael J. Folmer
(UMCP/ESSIC/CICS)**

Satellite Liaison at OPC/SAB/TAFB/WPC

NOAA Representatives:

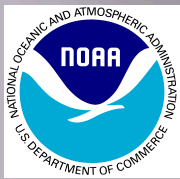
**David Novak (WPC), Andrew Orrison (WPC), Joseph Sienkiewicz (OPC),
James Clark (OPC), Hugh Cobb (TAFB), Nelsie Ramos (TAFB), Jamie Kibler (SAB),
Steve Goodman (GOES-R) and Mitch Goldberg (JPSS)**

**6th NOAA Testbeds & Proving Grounds Workshop
04/15/15**



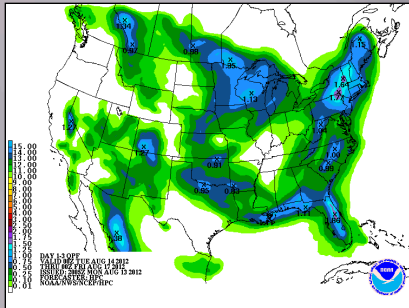
Presentation Outline

- ▣ **Introduce the National Centers that make up the “Satellite Proving Ground for Marine, Precipitation, and Hazardous Weather Applications”**
 - Weather Prediction Center (WPC)
 - Ocean Prediction Center (OPC)
 - Tropical Analysis and Forecast Branch (TAFB)
 - NESDIS Satellite Analysis Branch (SAB)
- ▣ **GOES-R/JPSS Demonstrated Proxy Products**
 - RGB Products
 - GOES-14 Super Rapid Scan Operations for GOES-R (SRSOR)
 - WRF/NAM Simulated Imagery
 - Overshooting Top Detection
 - Convective Initiation
 - GOES-R Lightning Detection Product
 - Nearcast Model
 - ATMS Microwave Products
 - Day Night Band (VIIRS)

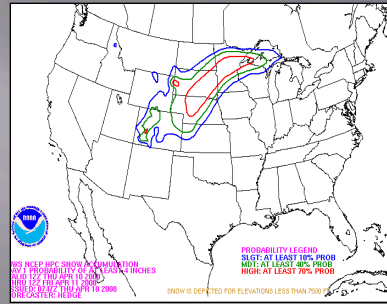


WPC OPERATIONAL DESKS

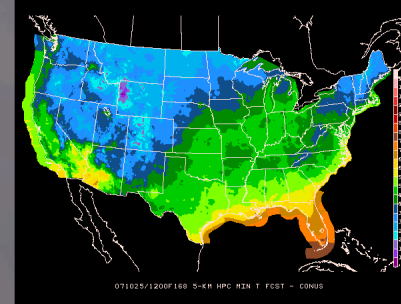
AS OF APRIL 2015: 29 FORECASTERS



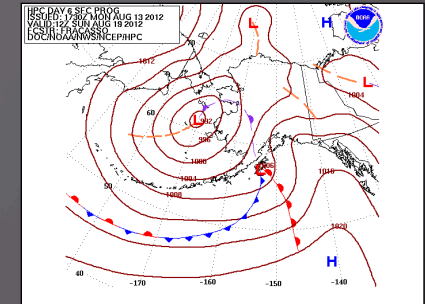
QPF



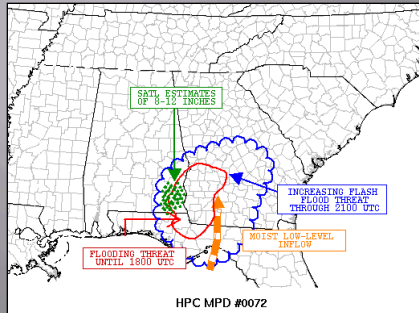
Winter Weather



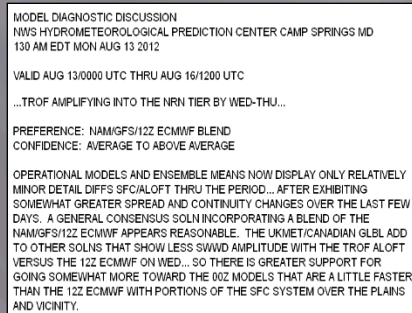
Medium Range



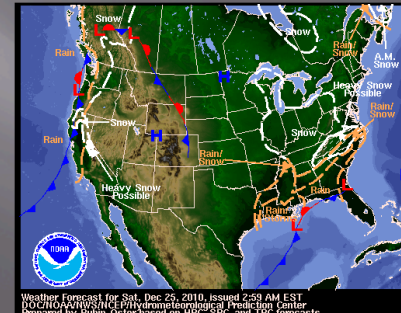
Alaska Med. Range



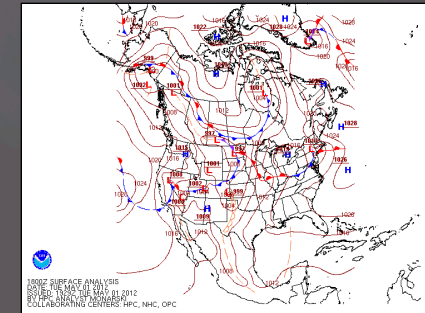
Met Watch



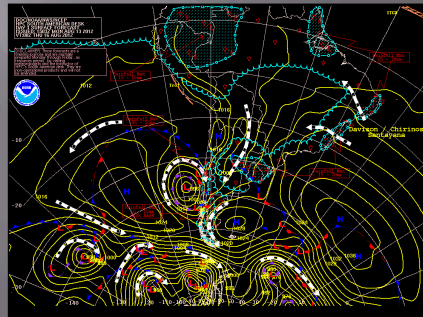
Model Diagnostics



Short Range



Surface Analysis



International



Tropical



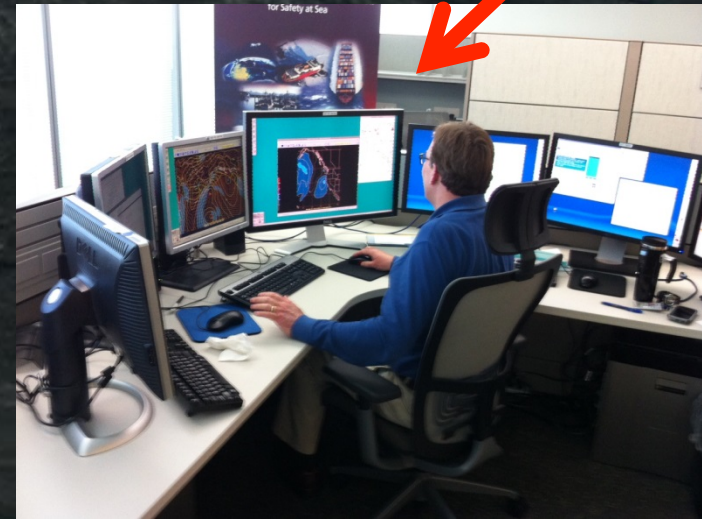
NOAA National Weather Service

OPC and TAFB

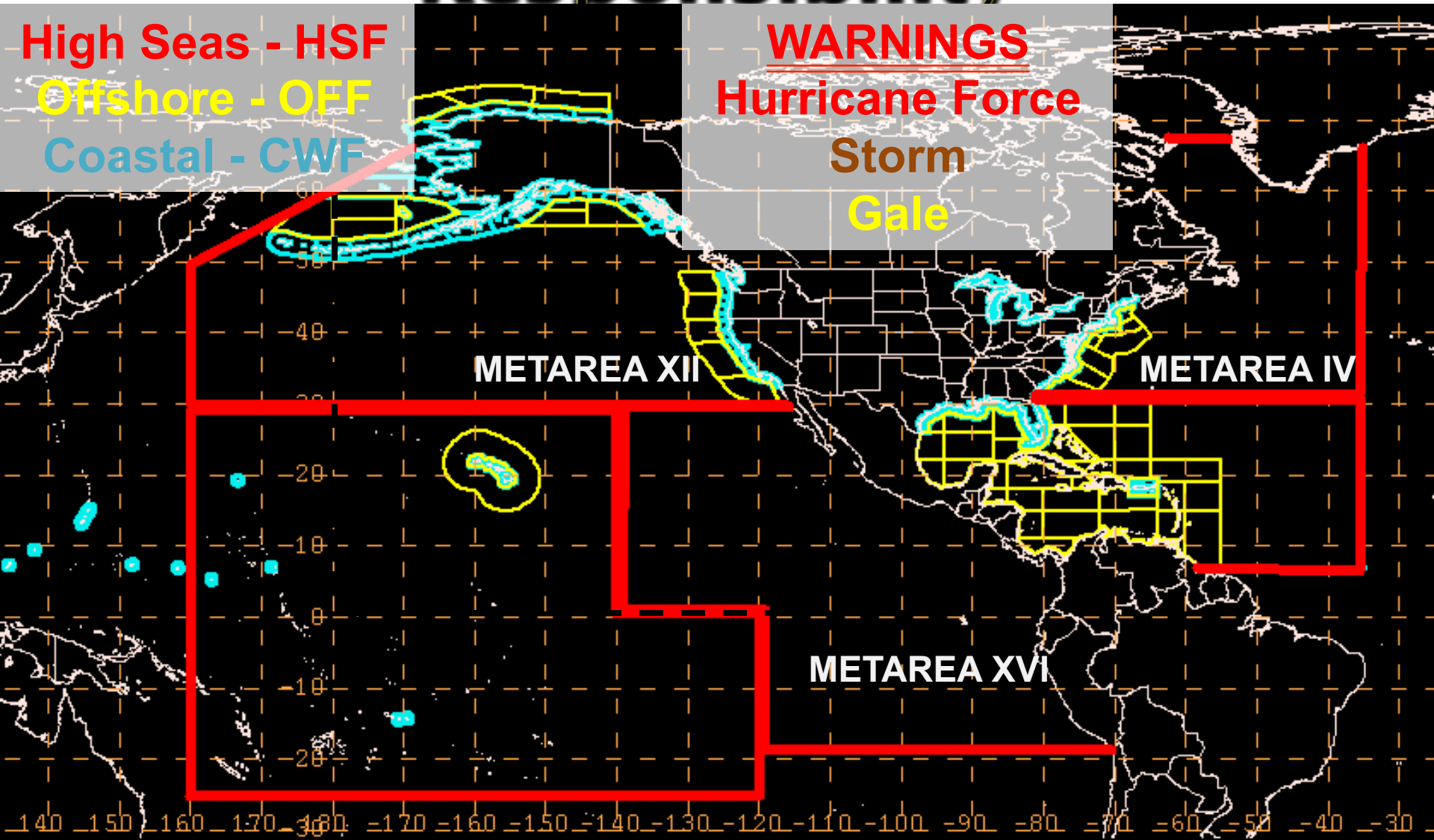
As of April 2015: OPC – 19 forecasters, TAFB – 17 forecasters

- ▣ Atlantic and Pacific High Seas
- ▣ Atlantic, Pacific, Gulf of Mexico, and Caribbean Offshore Zones
- ▣ Outlook (Medium Range)
- ▣ Special Project Support
 - Antarctica NMFS
 - USCG Arctic (with AR)
 - Japan
- ▣ Tropical Cyclone Classifications (TAFB only)

My Cube



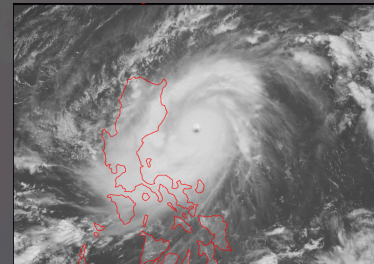
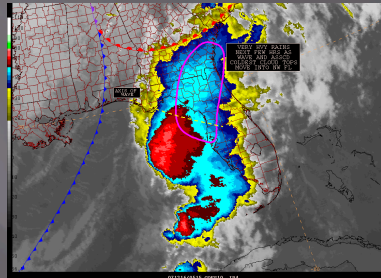
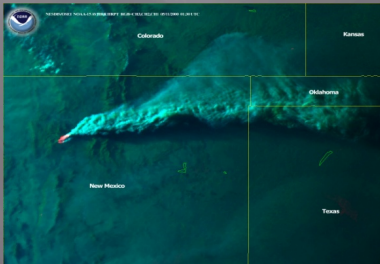
NOAA/NWS Marine Responsibility



NESDIS Satellite analysis Branch

As of April 2015: 15 analysts

- ▣ **The Smoke, Fire and Air Quality Program**
- ▣ **The Precipitation Program**
- ▣ **The Volcanic Ash Program**
- ▣ **The Tropical Program**



Training Conducted at the MPS PG

- ▣ All training to this point has been conducted in person, either individually or in small groups (3-5 forecasters/analysts at a time)
- ▣ Use PowerPoint presentations, then a Quick Guide is made available for the forecasters to get quick answers to analysis questions. COMET modules and blogs are also shared.
- ▣ The Liaison interacts with forecasters post training to discuss the products and points out significant uses when necessary.
- ▣ Training for TAFB and NASA HS3 has also been conducted in person, with additional information for HS3 available via a CIRA website. Training materials can be shared with NWS WFOs.



Training Conducted at the MPS



AIRS Total Column Ozone and Ozone Anomaly Quick Guide by NASA/SPoRT

Why are AIRS Ozone Retrievals Important?

AIRS Total Column Ozone (TCO) and Ozone Anomaly products developed by NASA/SPoRT can be used to diagnose regions of warm, dry, ozone-rich stratospheric air. These regions indicate the possible presence of a stratospheric intrusion or tropopause fold; features which aid cyclogenesis or can lead to non-convective high wind events. Carlson (1998) notes that inspection of the tropopause structure can aid surface cyclogenesis forecasts due to the fact that the time lag between initiation of strong 500 mb vorticity advection, tropopause folding, and cyclogenesis may be on the order of hours to a day or more.

How do I interpret ozone values and anomalies?

The ozone analysis by itself can be difficult to interpret. The ozone layer's average thickness is about 300 Dobson units (DU); however the climatological mean varies seasonally and spatially. Therefore, identification of stratospheric air based on high total column ozone values could lead to misinterpretation if the values actually range within climatology. Van Haver et al. (1996) identified stratospheric air and tropopause folds as layers where the ozone is at least 25% larger than the climatological mean. Ziemke et al. (2011) constructed a zonal monthly mean climatology of stratospheric ozone on a global scale derived from the NASA Microwave Limb Sounder. The Ozone Anomaly product was created by SPoRT as a percent of normal from this climatology, with a scale ranging from 0-200%. For ease of interpretation and significance, the scale on the Ozone Anomaly product switches to shades of blue at 125% and greater. Therefore any blue shade on the anomaly product represents stratospheric air.

What to look for in the imagery?

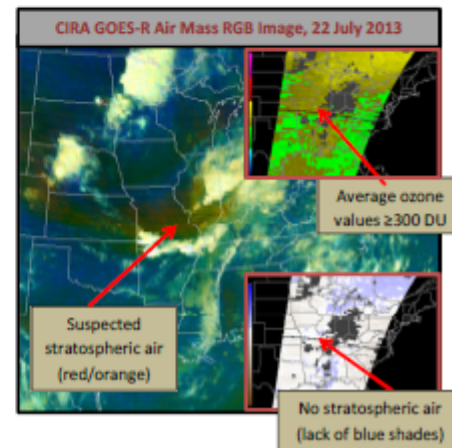
The Ozone Anomaly is intended to be used with products like the Air Mass RGB imagery, which only has qualitative colors for the user to interpret. Often, a red coloring results in the Air Mass RGB when a jet streak causes a stratospheric air intrusion (see reverse side). However, other dry air conditions can also result in red coloring in the RGB (see adjacent figure). The ozone anomaly product helps to quantify the red colors seen in the RGB. This confirms to the user whether it's really stratospheric air or not.

What is AIRS and when is it available?

The Atmospheric Infrared Sounder (AIRS) is an instrument on the polar-orbiting Aqua spacecraft, and it's available 2x/day, valid approximately 2:00 AM & PM locally (slight daily orbital variation) with a latency of about 4 hours. The instrument measures temperature and water vapor with height, as well as clouds, ozone, carbon monoxide, carbon dioxide, methane, sulfur dioxide, and dust.

Caveats

Thick clouds can interfere with the infrared energy measured by AIRS and therefore, result in missing values in these locations. To overcome the limitation in partly cloudy conditions, AIRS data are combined with data from microwave instruments on Aqua. Visit <http://airs.jpl.nasa.gov> to learn more about AIRS.



- These maps from this PG...
- The diagrams provided...
- Determine particular introduced...
- Learning complex displays...

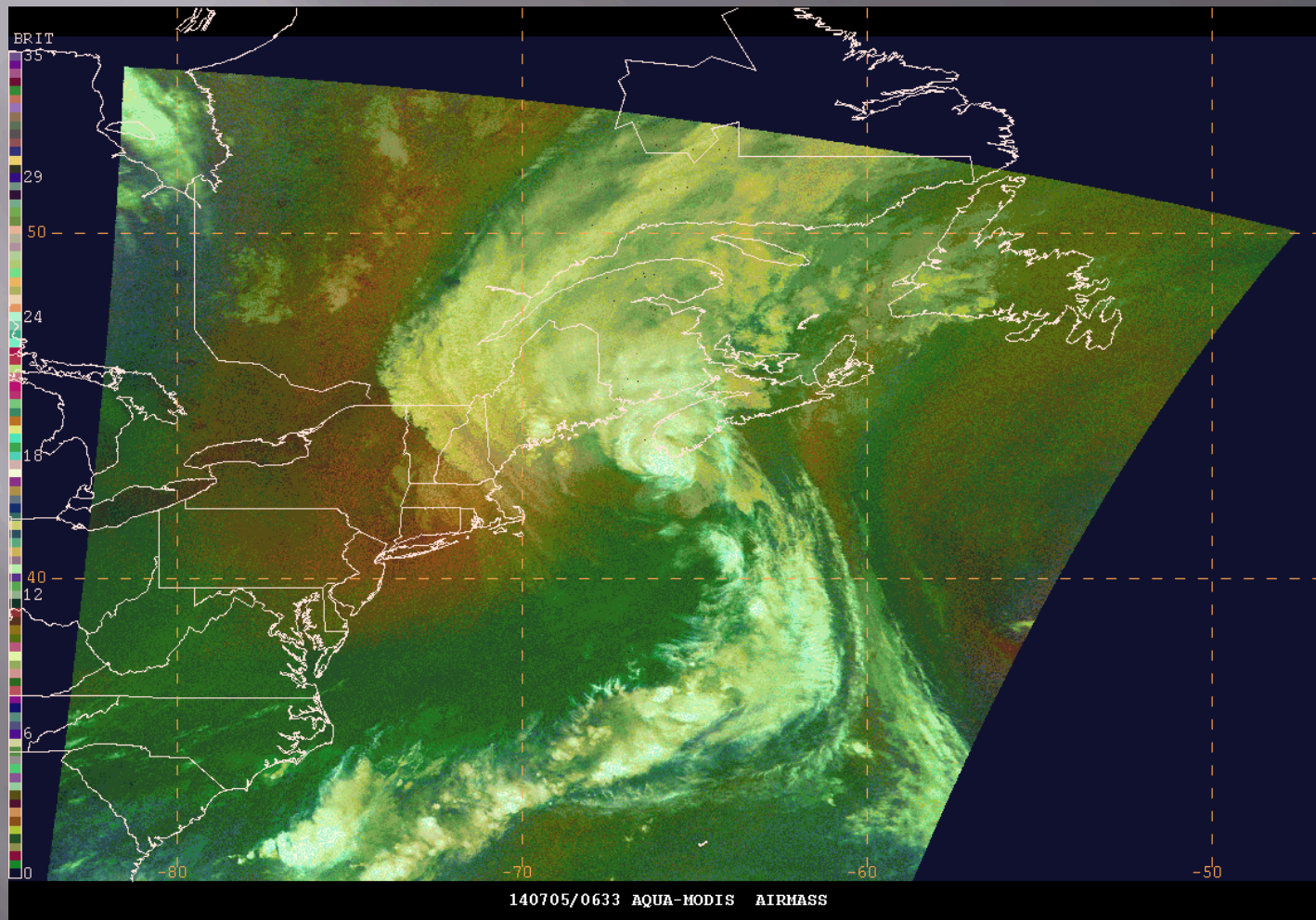
well with error:
ucts and
for a
ly the list).
hat
ted

PROVING GROUND DEMONSTRATIONS 2012-2015

RGB Products
Overshooting Top Detection
GOES-R Lightning Detection
GOES-14 SRSOR
ATMS 88 GHz
Ozone Products

MODIS Air Mass RGB (GOES-R/JPSS)

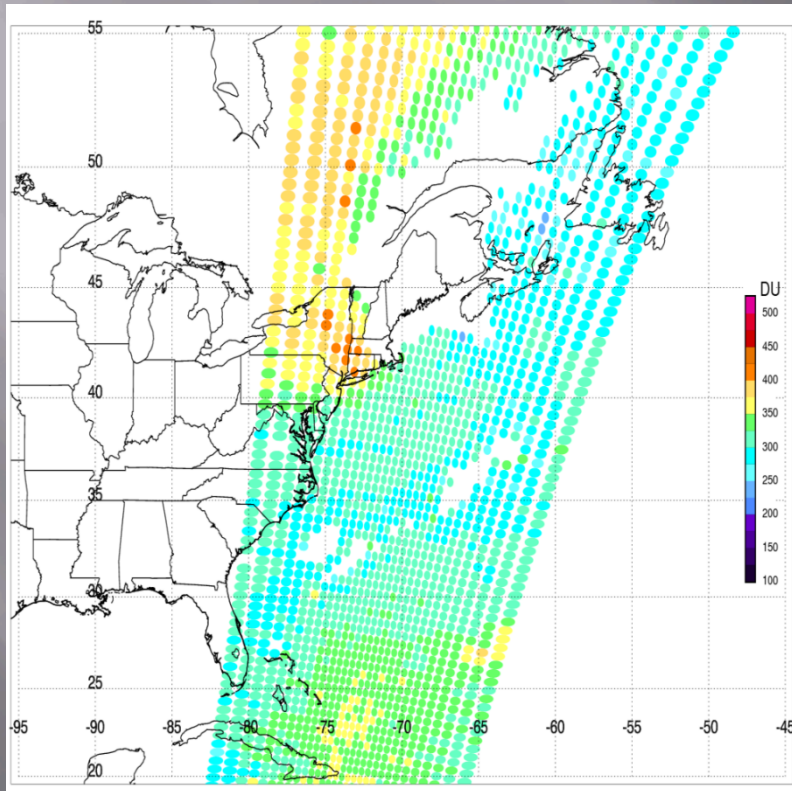
Start of Hurricane Arthur's Extratropical Transition on
07/05/14



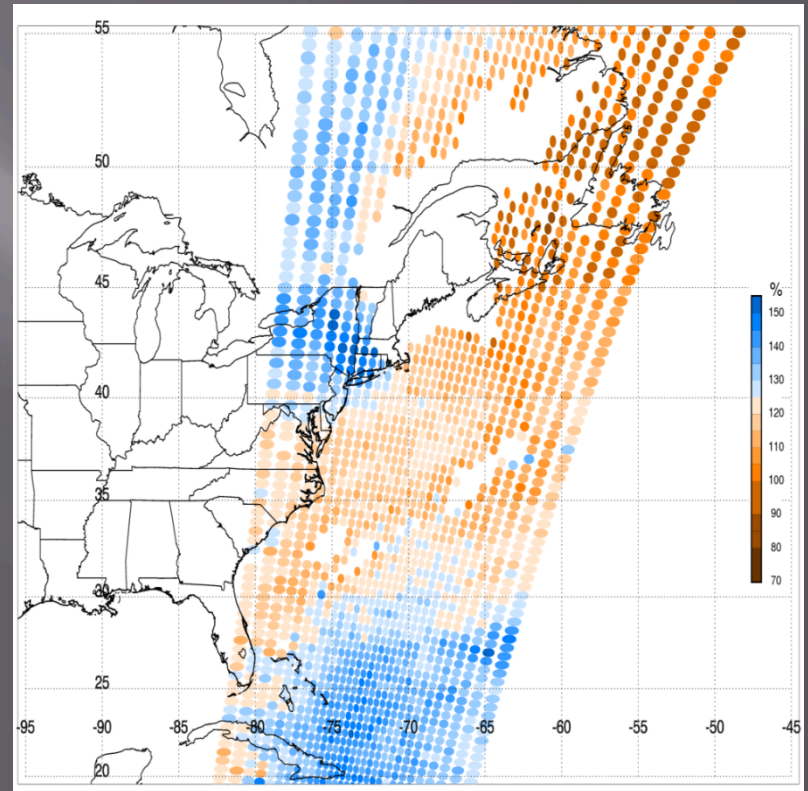
AIRS Ozone Products (JPSS):

Start of Hurricane Arthur's Extratropical Transition on
07/05/14

AIRS
TOTAL COLUMN OZONE

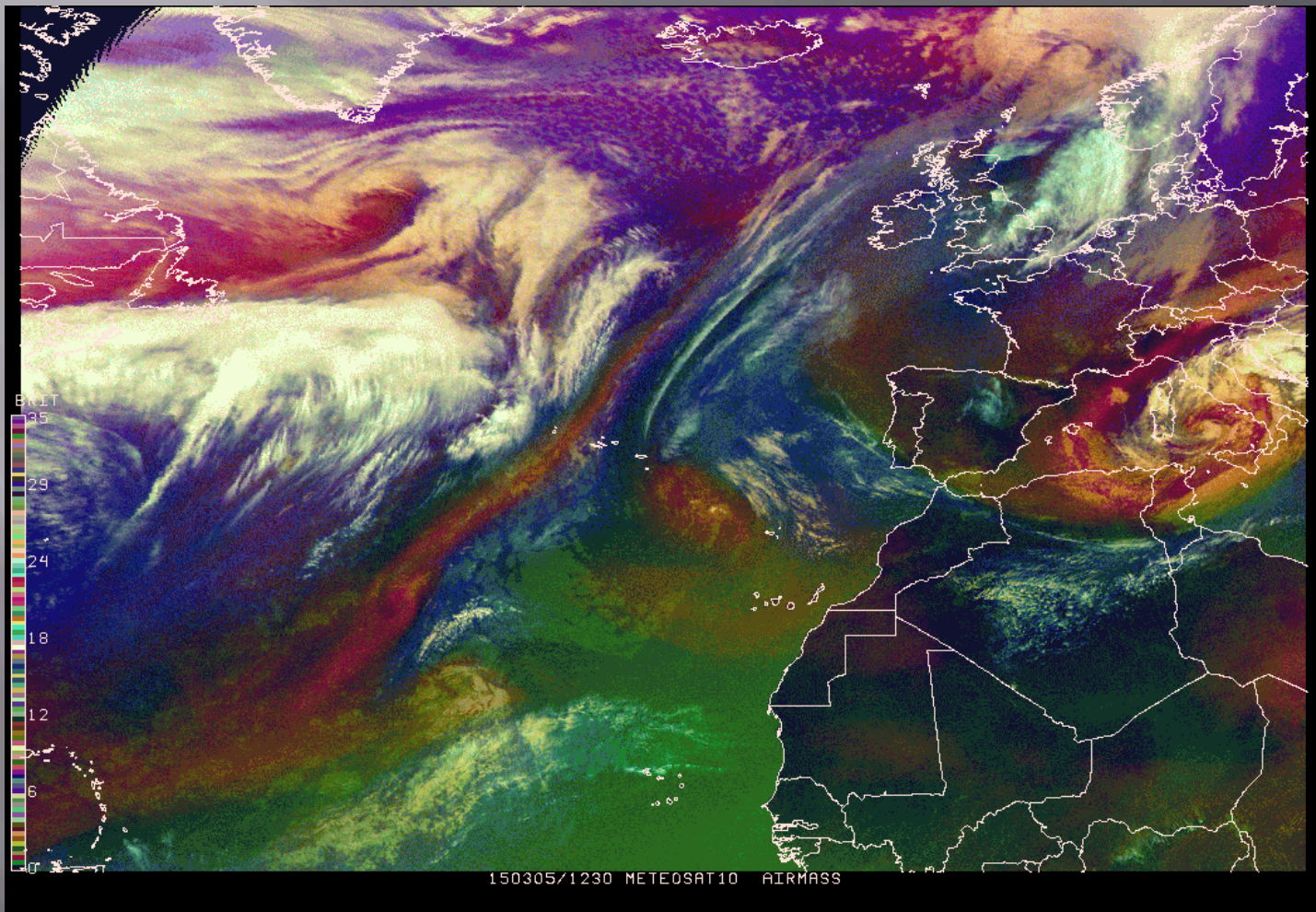


AIRS
OZONE ANOMALY



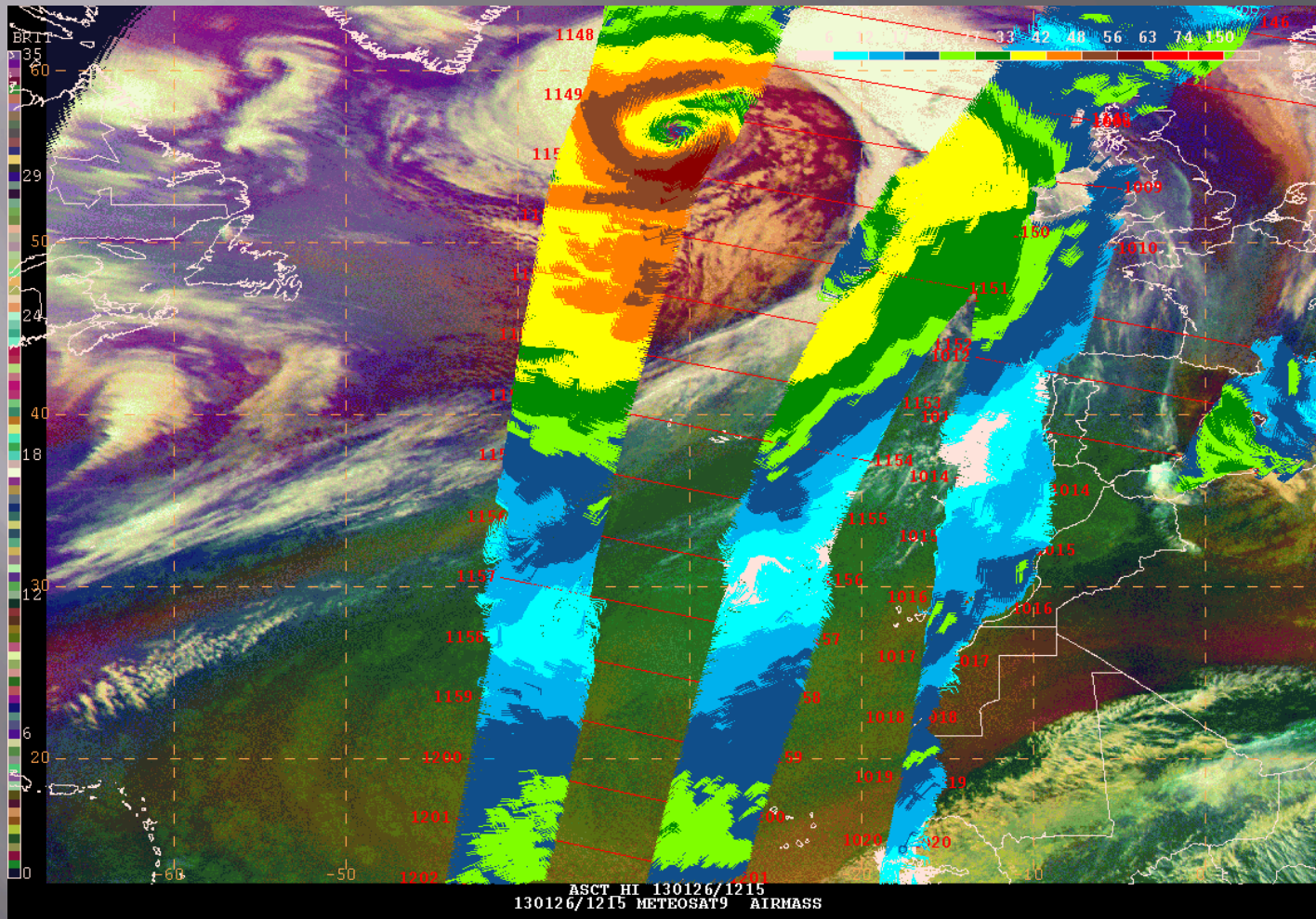
SEVIRI Air Mass RGB (GOES-R)

March 2015 Hurricane-Force Storm Events



Animation courtesy of James Kells (OPC)

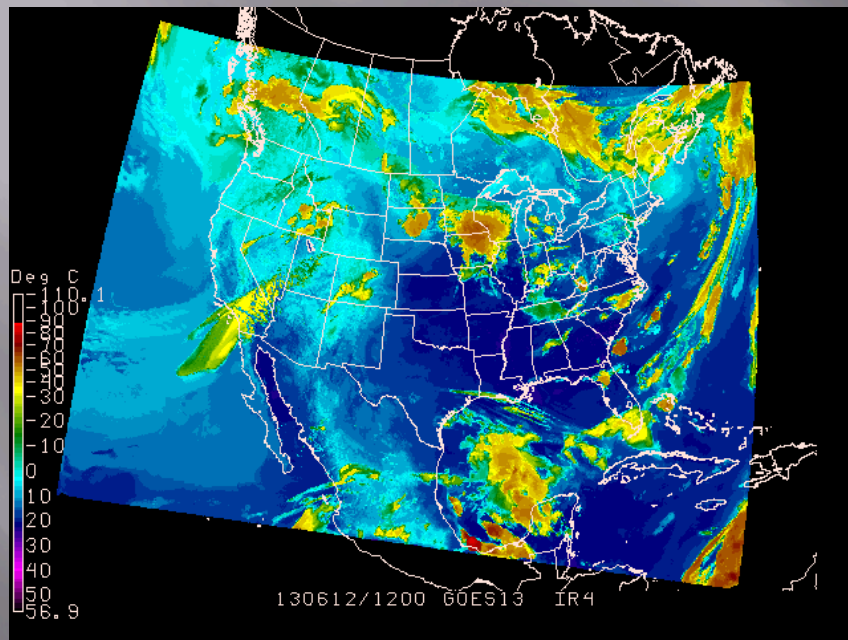
SEVIRI Air Mass RGB (GOES-R) ASCAT overlay



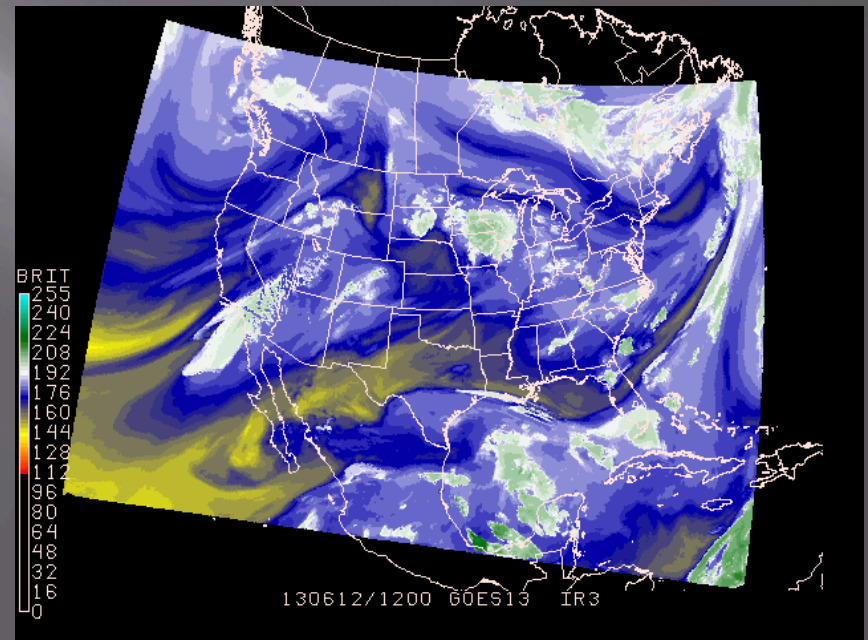
NAM Nested 4km Simulations

Low-End Derecho on 06/12/13

INFRARED (10.7 μM)

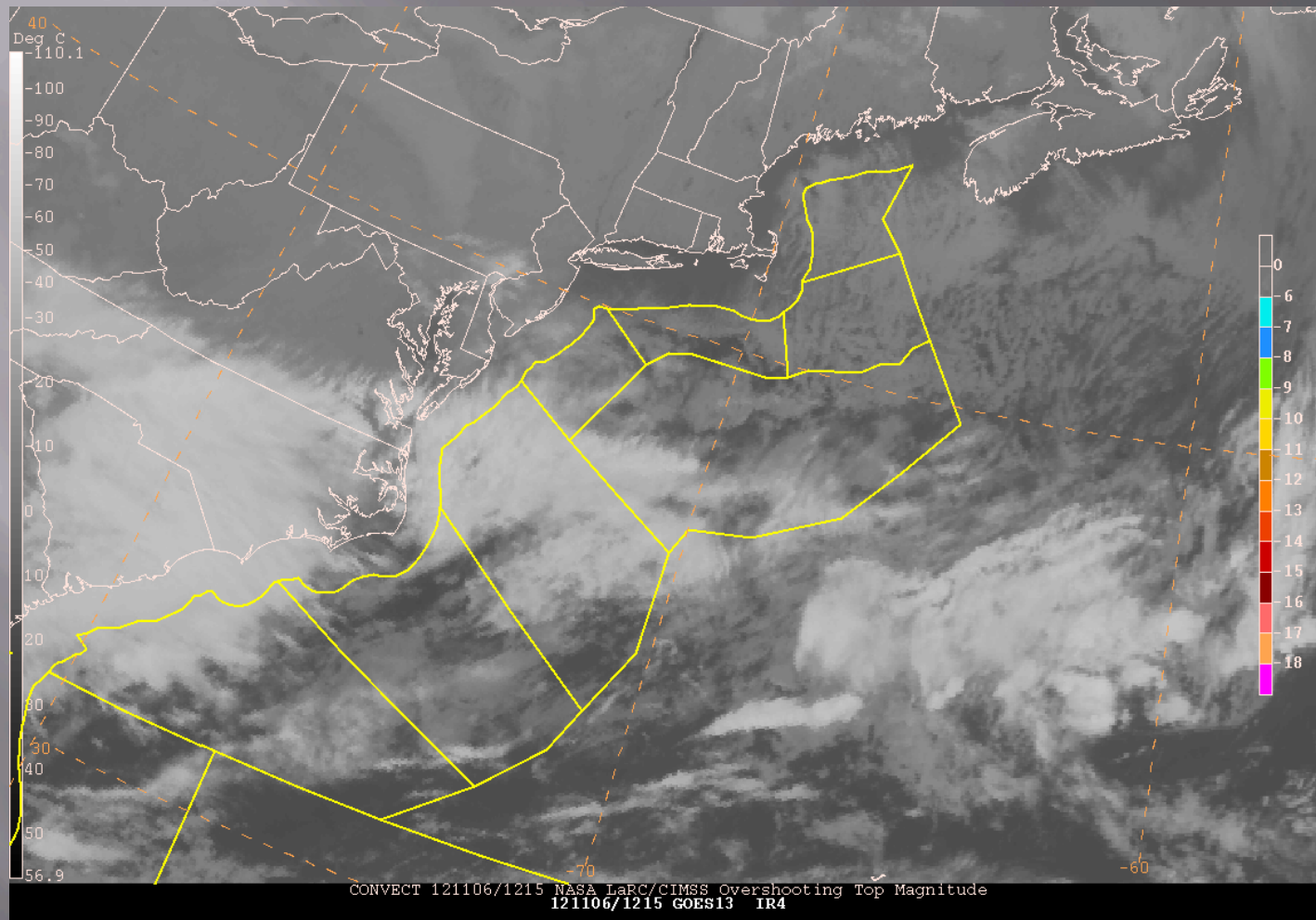


WATER VAPOR (6.5 μM)



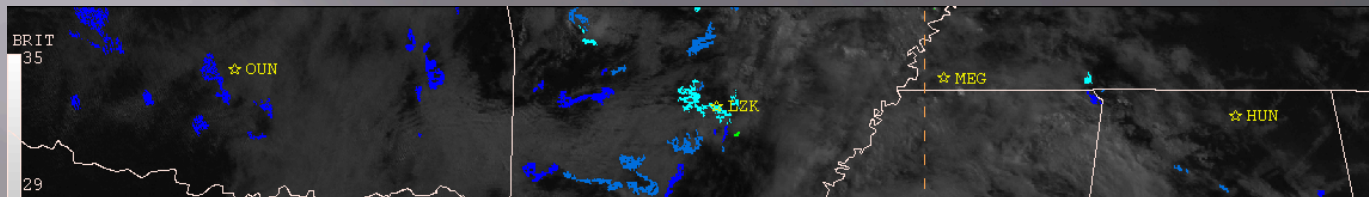
GOES-R Overshooting Top Detection/ Magnitude

GOES-13 Infrared and Proxy OTM for strong nor'easter on 11/06/12



GOES-R Convective Initiation

Lake Charles, LA Flash Flood Event on 06/27/14



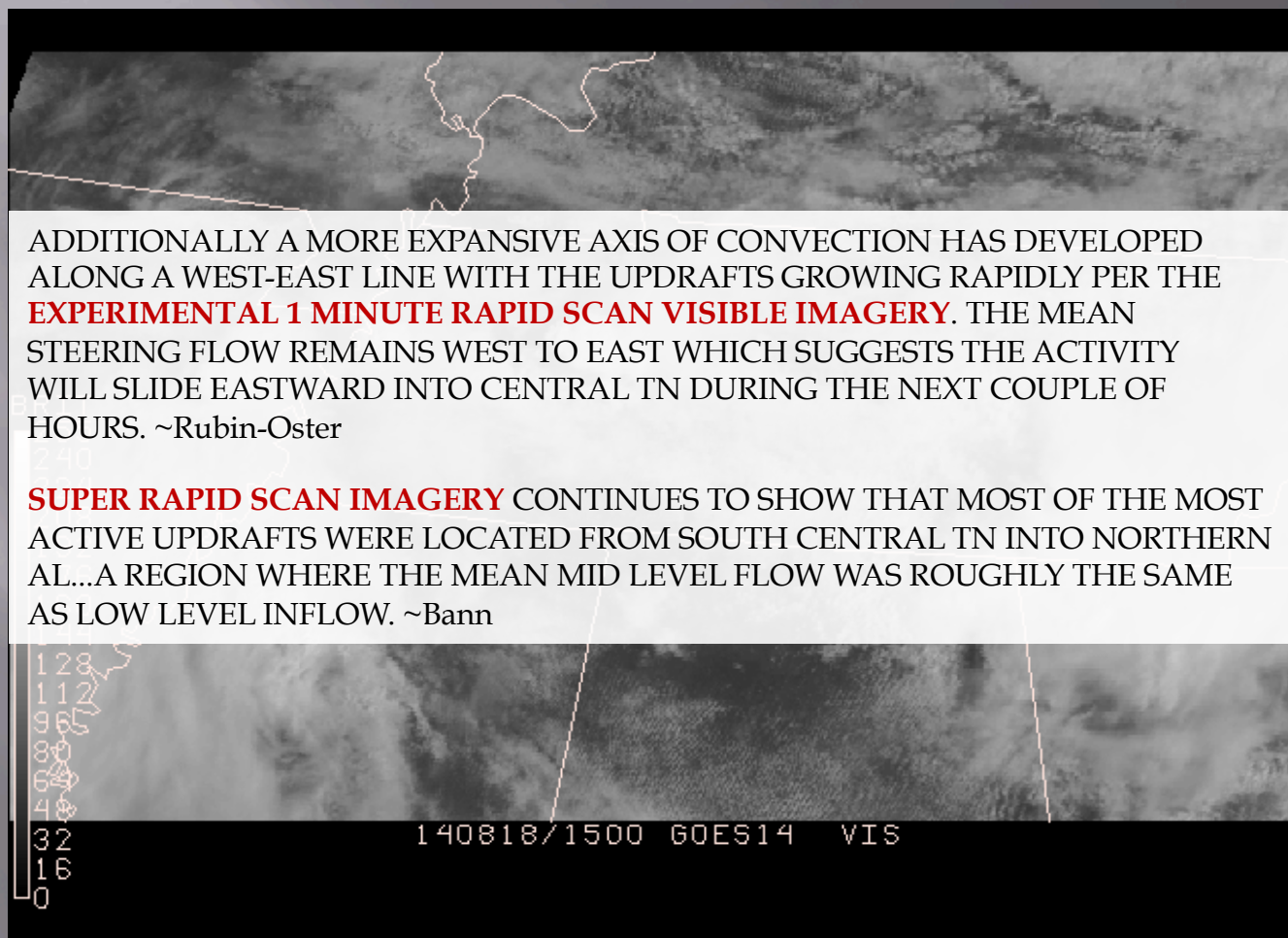
SHORT TERM OUTLOOK VALID 1750-2250Z...HIGH CONFIDENCE FACTOR IN SHORT TERM OUTLOOK...ALREADY CONVECTION HAS DEVELOPED ACROSS PORTIONS OF SE TX/SW LA THIS AFTERNOON WITH SOME LOCATIONS RECEIVING A QUICK 2-3" IN AN HR. INCREASING CONCERN OF ADDITIONAL CONVECTION DEVELOPING/EXPANDING N FROM GULF OF MEXICO AHEAD OF SHORTWAVE TROF THAT IS GRADUALLY LIFTING NEWD ACROSS ERN TX/WRN GULF OF MEXICO. **WITHIN THE LAST HR AN OUTFLOW BOUNDARY HAS BEGUN TO PROPAGATE NWD TOWARDS TO COASTLINES OF SE TX/SW LA WITH NEW CONVECTION ALREADY BEGINNING TO INITIATE. GOES CI ALGORITHM DOES SUGGEST POSSIBLE TO LIKELY ADDITIONAL CONVECTIVE TO DEVELOP AHEAD/ALONG OUTFLOW BOUNDARY IN THE NEXT COUPLE OF HRS.** ATTN OBJECTIVE SFC MOISTURE CONVERGENCE MOISTURE HAS A STRONG MAX LOCATED ALONG THE SW LA COAST. GIVEN THE STRONG SRLY 85H MOISTURE TRANSPORT OF 2.0"+ PWS AND SLOW-MOVING NATURE OF THE SHORTWAVE...THINKING THIS STRONG MOISTURE FLUX SHOULD ONLY GRADUALLY SHIFT NWD OVER THE NEXT 2-4 HRS...FAVORING REPEAT CELL ACTIVITY. ~Warren



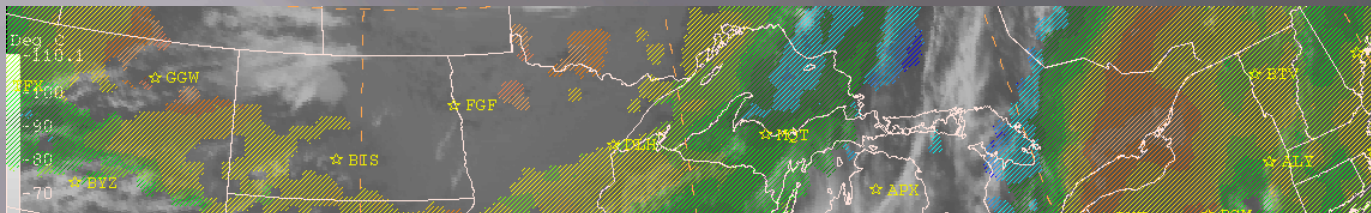
140627/1300 GOES Convect Init prob(%)

GOES-R Mesoscale Mode

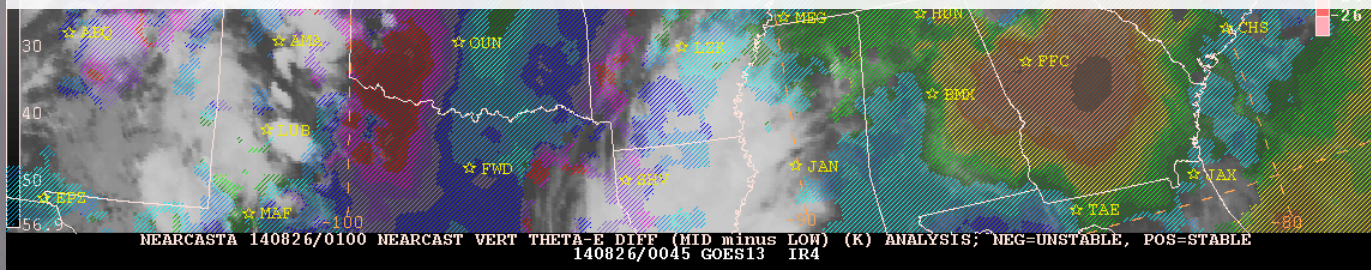
GOES-14 SRSOR for Heavy Rain in TN on 08/18/14



Nearcast Model overlaid on GOES-13 Infrared Imagery (GOES-R/JPSS) Theta-E Difference

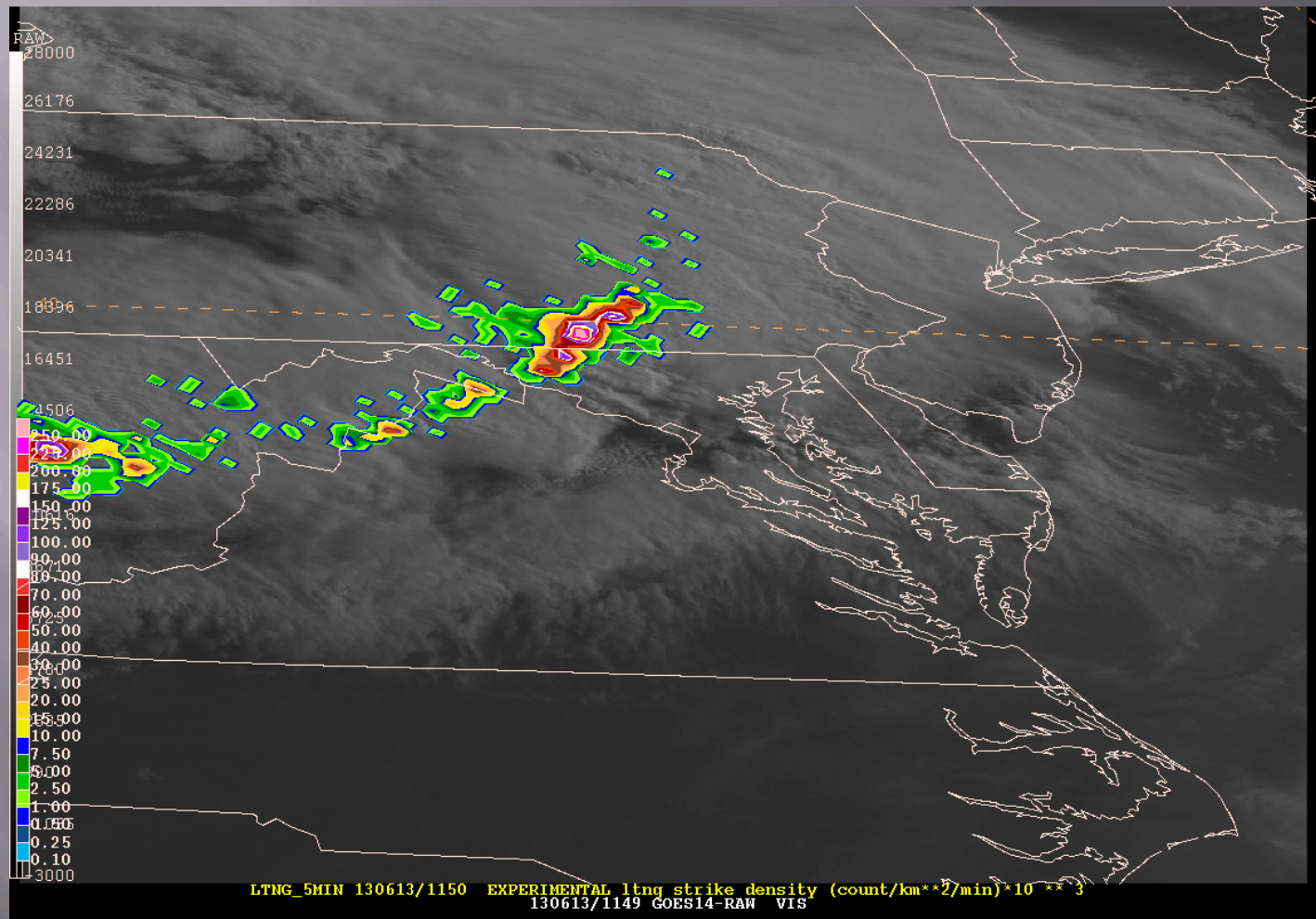


THE 00Z NAM-CONEST AND 00Z NSSL-WRF INDICATE A FORMIDABLE W/E OR WSW/ENE AXIS OF STRONG CONVECTION SETTING UP THROUGH 06Z AND TWD THE PREDAWN HOURS INVOLVING SERN NEB AND CNTRL AND SWRN IA. ADDITIONALLY...**THE EXPERIMENTAL NEARCAST PRODUCT INDICATES AN AXIS OF DIFFERENTIAL THETA-E THAT SUPPORTS AN INSTABILITY AXIS ACROSS SERN NEB AND THROUGH A LARGE PART OF CNTRL AND SRN IA. THIS IS ALREADY WITHIN THE INSTABILITY GRADIENT AS SEEN BY THE LATEST RAP ANALYSIS...BUT THE NEARCAST PRODUCT INDICATES THIS PERSISTING THROUGH 12Z. THEREFORE...CONFIDENCE IS RATHER HIGH** THAT CONVECTION WILL CONTINUE TO ORGANIZE AND EXPAND IN A GENERAL WSW/ENE FASHION OVERNIGHT AND ADVANCE INTO OR DEVELOP ACROSS CNTRL/SWRN IA IN PARTICULAR. ~Orrison

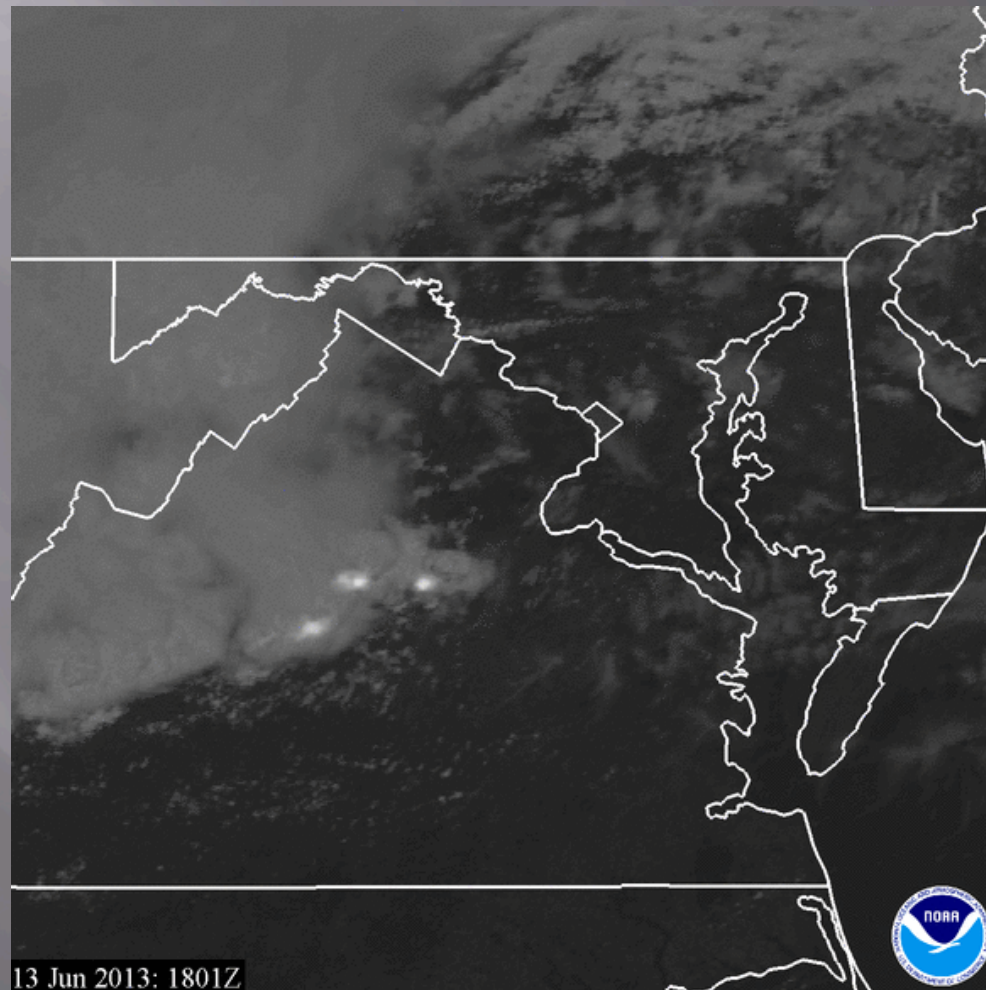


GOES-R Mesoscale Mode with GOES-R Lightning Detection

Proxy using GOES-14 SRSOR and GLD-360/NLDN Lightning Density



GOES-R Mesoscale Mode with the DC Lightning Mapping Array (Proxy GLM) Read more on the “It’s Severe” blog



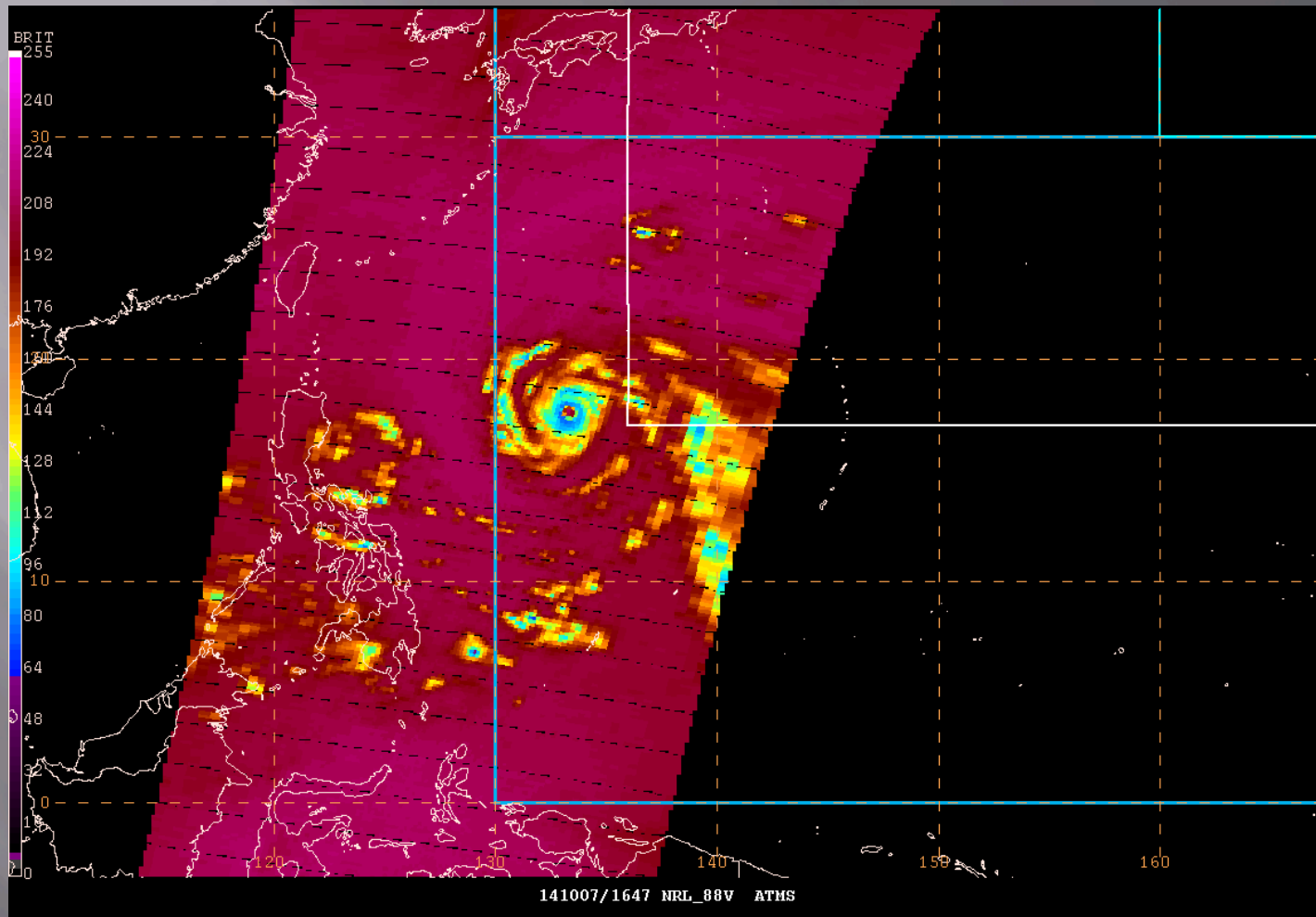
Courtesy of Scott Rudlosky (NESDIS/STAR) and Pat Meyers (CICS)

June 13, 2013 “Derecho” Ocean Perspective



ATMS 88GHz “V” (JPSS)

Super Typhoon Vongfong near maximum intensity
155 kts (175 mph)



Courtesy of NASA SPoRT and NRL

Forecaster Feedback on Products:

- ▣ GOESRCI, SAB: For our operations and from my perspective, it did give advance notice of convective development on a couple of occasions, but generally had somewhat limited use given the agitation in the CU field was already seen.
- ▣ RGB Air Mass, WPC: I think the RGB Air Mass product provides advantages to water vapor imagery on occasion if the disturbance is large enough to show up, and obscured in traditional satellite imagery. It is also helpful to see stratospheric air clearly on the RGB product and compare directly to model PV or vorticity fields.
- ▣ OTD/OTM, OPC: Used the magnitude product more frequently than the detection. On a few occasions, when used in conjunction with lightning density and IR imagery, it was useful in determining severe potential of individual offshore supercells.
- ▣ RGB Products, TAFB: Both imagery complemented the suite of imagery aforementioned. The imagery also complemented the convection enhancement in satellite imagery (i.e. low, moderate, high). For example, the RGB Air mass imagery showed middle to upper level dry air in regions of tropical wave environment devoid of convection. The same was true for the Dust imagery; in regions where dust was present, convection wasn't.

Forecaster Feedback on Demonstrations:

- ▣ More examples of applications of these products in real-world examples that demonstrate advantages over traditional model/satellite views would help to prove the utility of these experimental satellite products.
- ▣ Perhaps once per month a center could submit a case study on how they used a proving ground product and why they found it useful (or not useful). The centers could each take turns doing this and anyone from the chosen center could submit the case study. Sharing this case with the group via the satellite blog would help to show how a product is being used differently by various groups and would also encourage more use of the products overall.
- ▣ Handouts with general rules of thumb on how to use or not use the products either via email or even old fashioned paper copies are always appreciated since knowledge learned in the demonstrations may not all be retained.

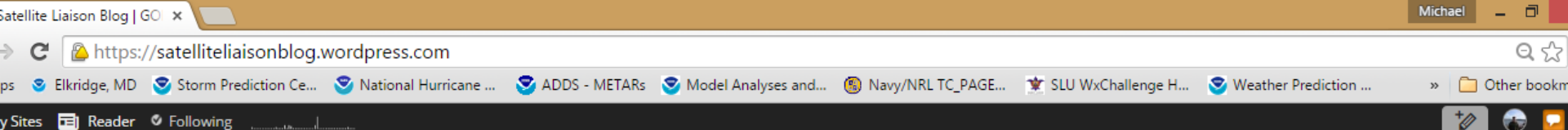
2015 Demonstrations

- ▣ 01/15/15 – 04/15/15
 - Products
 - ▣ Fog and Low Stratus
 - FLS Product
 - GeoColor
 - RGB Nighttime Microphysics
 - ▣ RGB Air Mass and Ozone Products
 - Refresher training and comparisons with water vapor
- ▣ 06/01/15 – 11/30/15
 - Products
 - ▣ Convection and Heavy Rainfall/Flash Flooding
 - GOES-R Lightning Detection Product
 - Overshooting Top Detection
 - GOES-R Convective Initiation
 - Cloud Top Cooling (New)
 - Layered Precipitable Water (New)
 - GOES-14 SRSOR
 - Nearcast
 - New JPSS Products (TBD)
 - RGBs
 - Atmospheric Motion Vectors (New)
 - Himawari Training to start in coordination with COMET, Pacific Region, and Alaska Region readiness (Summer)

Conclusion

- ▣ The WPC, OPC, and SAB have progressed from using basic satellite channels to new satellite techniques with help from the Satellite Proving Ground.
- ▣ The main uses of satellite imagery at these centers is to compare current conditions with NWP initialization and current conditions.
- ▣ New GOES-R and JPSS satellite products are assisting current operations, well ahead of launch time.
- ▣ Future direction: Continue to explore new satellite techniques that will enhance operations and lessen forecast errors.

GOES-R and JPSS National Centers Perspective Blog



Satellite Liaison Blog

GOES-R & JPSS: The Future of Weather Satellites

HOME ABOUT THE BLOG

Posted by Michael Folmer on 03/17/2015 [Edit This](#)

A Wild Week in the Tropical Pacific (follow-up to 3/11/2015 post)

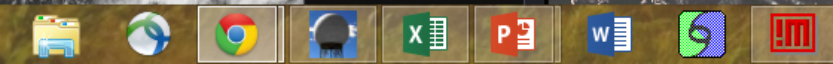
Posted in: MTSAT-2, OPC, Tropical. Tagged: Australia, Infrared, MTSAT-2, TC Nathan, TC Olwyn, TC Pam, Tropical Cyclones, TS Bavi. [Leave a comment](#)

Last week I posted on the very active tropical Pacific Ocean with four storms occurring simultaneously. Tropical Cyclone Pam (17P) made a devastating visit to the island nation of Vanuatu as a Category 5 (145 kts or 165 mph) cyclone and has since joined the westerlies after passing near New Zealand as a much weaker system. Currently, the majority of the region has quieted down some, but Tropical Cyclone Nathan (east of Queensland) and Tropical Storm Bavi (West Pacific) are still active, while Tropical Cyclone Olwyn dissipated after making landfall in Western Australia. Jim Kells (OPC) compiled a few animations that show the evolution of all four tropical cyclones starting on 03/08/15. The imagery is courtesy of the MTSAT-2 satellite and we are eagerly anticipating the new Himawari-8 satellite data over the next few months.

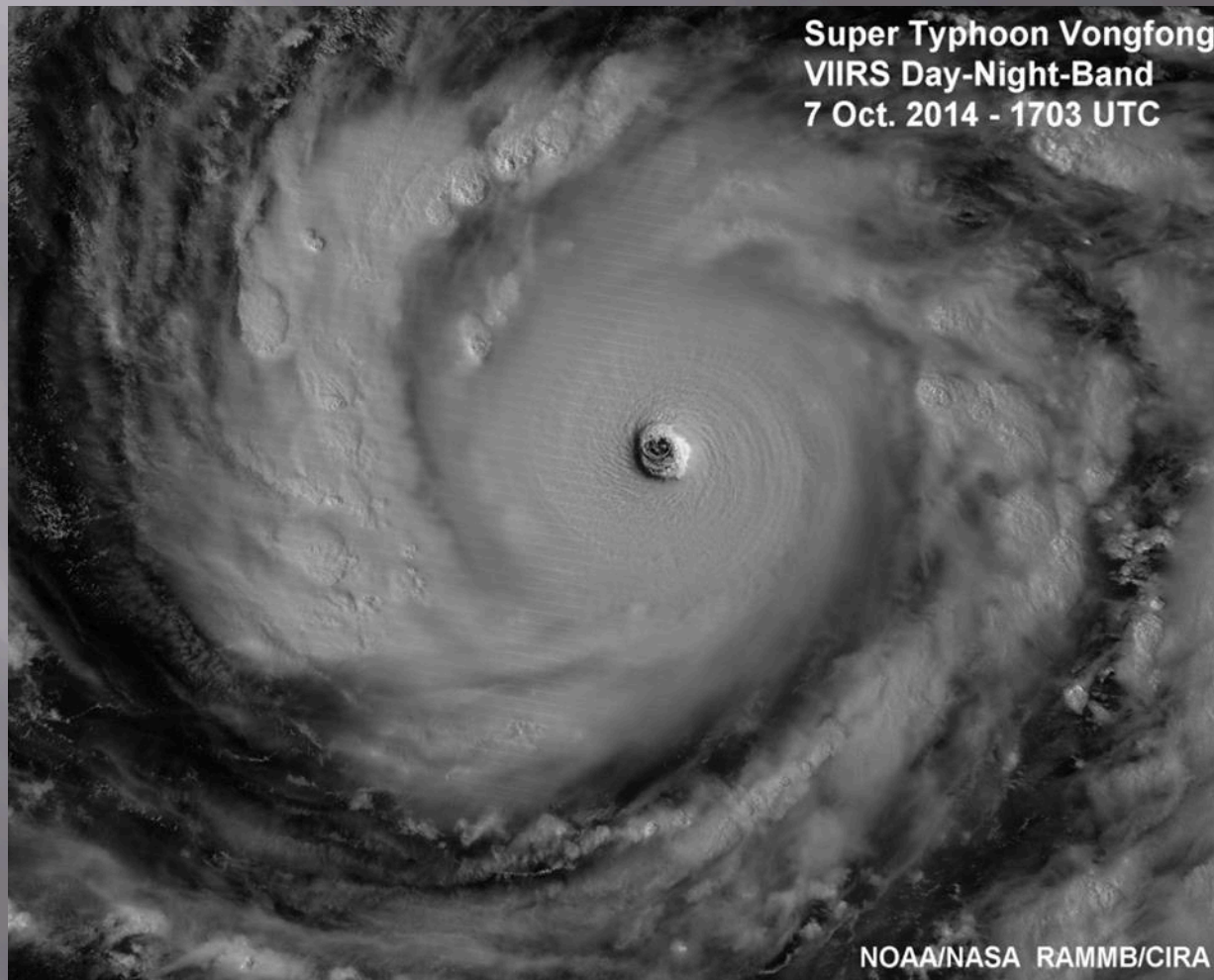


You are following this blog

You are following this blog, along with 1,027 other amazing people ([manage](#)).



Questions?



Super Typhoon Vongfong (2014)